Offshore Environmental
Studies Program

Fiscal Year (FY) 2005 – 2007 Studies Development Plan

Pacific OCS Region

U.S. Department of the Interior
Minerals Management Service
Pacific OCS Region
Camarillo, CA **2004**

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1.1 Introduction to the Region

The Environmental Studies Program in the Pacific Outer Continental Shelf (OCS) Region started in 1974. The Program has evolved with changes in the geographic areas of concern and study, in the emphasis of disciplines highlighted for research, and in the emphasis of oil and gas activities from pre-lease activities to post lease activities. In particular, this annual plan reflects the need for information for regulating ongoing oil and gas production and development activities as well as focusing on future decommissioning activities. As the Region has matured and as developed oil and gas fields have reached peaks of production and entered declines, new and innovative ideas for the use of traditional oil and gas platforms have emerged. New uses of oil and gas platforms have included sites for mariculture and Liquid Natural Gas (LNG) facilities. The need for new or updated environmental studies may well accompany the decisions that MMS may need to make with regard to such innovative and non-traditional uses of offshore facilities. This plan complements and reinforces the Environmental Studies National Strategic Plan.

Existing production and development activities and development of known resources on 43 existing producing leases in Southern California will continue for many years. The region has annual production of 78,000 bbls/day oil from its 23 facilities. It is expected that production from the majority of these facilities will continue for many years. However, decommissioning plans for some of the oldest facilities could be received by the Region within the next 5 years. This balance between ongoing operational and future decommissioning activities is reflected in the studies development plan. Future activities on the 36 undeveloped leases, however, remain highly controversial and uncertain. The projected OCS activities section of this report more fully discusses the activities we anticipate on existing leases.

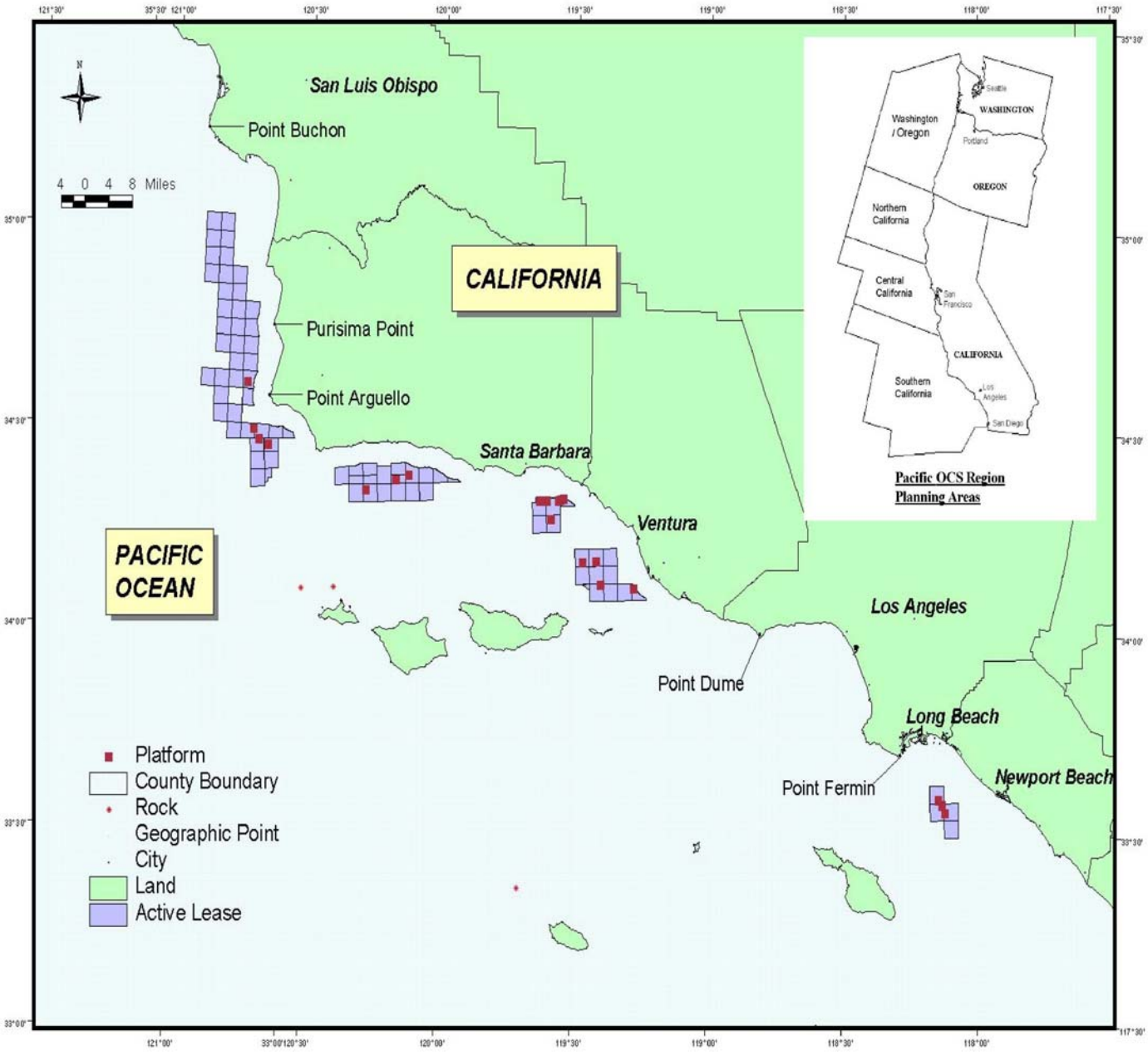
This document presents a strategy for the Pacific Outer Continental Shelf (OCS) Region. It does not apply to the entire Pacific OCS Region, which stretches from the United States-Mexico border to the border with Canada and includes Hawaii, but rather to the Southern California Planning Area (see map inset, figure 1). This plan focuses on the information needed primarily for existing oil and gas production activities and future oil and gas facility decommissioning for the Southern California Planning Area, which occur in the Santa Barbara Channel, the Santa Maria Basin and San Pedro Shelf.

The information which will be obtained through these studies is considered important and relevant to decision making. We consider this information important and appropriate to obtain because it fulfills the following criteria:

- The study provides significant new or additional information beyond what is already known;
- The identified study is within the financial scope and time frames of the Program;
- The information provides insight into significant processes critical for understanding both natural and anthropogenic changes;
- The issue can be studied within science's present abilities or understanding of experimental methods to gain the information.

Changes in future OCS oil and gas activities may dictate changes in the strategy. Findings from current or future research may also change the strategy and cause other avenues of research to be incorporated.

If you have any questions regarding this Pacific OCS Region Environmental Studies Development Plan, please contact Dr. Fred Piltz, Pacific OCS Region at (805) 389-7850 or Mary Elaine Dunaway at (805) 389-7848. You can also view the Minerals Management Service and Pacific OCS Region home pages at ***www.mms.gov*** for additional information.



1.2 Map of Active Leases

1.3 Projected OCS Activities

Prelease

We anticipate no lease sales for this planning area under the MMS Comprehensive Leasing Program for 2002 – 2007 nor are any projected for the future.

Postlease

The Southern California Planning area contains

- 79 active oil and gas leases
- 600 million barrels of oil in proved reserves on existing leases
- Up to one billion barrels in unproved reserves on existing leases

There are 43 producing leases in the Southern California Planning Area with 23 oil and gas platforms in Federal waters. These leases currently produce 78,000 barrels of oil per day and 200 million cubic feet of natural gas per day; a rate which could be sustained into the next decade. Continued production at these facilities will meet new challenges over the coming decade in the effort to maintain environmentally safe operations with the exisitng infrastructure. An additional 36 leases are undeveloped and remain in litigation. If some of these leases are allowed to move forward, it is expected that extended reach wells drilled from existing facilities would add measurably to sustaining production at existing facilities.

Decommissioning activities will become an increasingly important part of this Region's activities in the future as older facilities are phased out. Within the next 5 years, decommissioning plans could be received for some existing OCS platforms in Federal waters offshore California. The decommissioning process is envisioned to take about seven years from the receipt of a plan until all activities are completed. Concurrent decommissioning of attached pipelines and onshore facilities are expected for many of these facilities.

Studies are needed to address and monitor the environment adjacent to the existing facilities and these studies become more critical and challenging as the infrastructure continues to age. Examples of the use of environmental studies information include the recent replacement of a power cable to the Santa Ynez Unit (Santa Barbara Channel) offshore platforms. These platforms are powered from electric sources onshore via a cable. The cable needed to be replaced and the MMS used recent data from environmental studies in preparing an Environmental Assessment (NEPA document) for that post lease activity. Studies are needed now to support future decommissioning activities in the Pacific OCS Region. Studies identified highlight critical information gaps and are geared to allow MMS analysts to effectively permit and regulate the oil and gas industry in ongoing production and decommissioning projects.

Several new uses of oil and gas facilities have been proposed recently including using an oil platform as a base for mariculture operations and as a receiving port for Liquified Natural Gas (LNG).

1.4 Identification of Information Needs

The main areas of information needs fall into the following categories:

a. Understanding environmental impacts of decommissioning Pacific OCS facilities

Decommissioning plans for some of the older facilities could be received by the Region within the next 5 years. The long lead time needed to address environmental issues related to decommissioning deepwater oil and gas platforms means that decommissioning studies will need to be started now.

To address this critical need and to leverage funding, we began the **Decommissioning Studies Initiative** in FY 03. This long-term umbrella initiative provided a mechanism for MMS to address study needs with joint funding by industry and other agencies. Over the past year we have refined our decommissioning studies needs through the MMS sponsored Decommissioning Studies Workshop. It appears that the most cost effective mechanism for procuring these studies will be through individual contracts rather than one overarching contract. MMS is committed to obtaining co-funding by industry and other agencies to reduce costs to MMS. Studies for decommissioning will be carried out in close coordination with the IDWG (Interagency Decommissioning Working Group), a group of Federal, State and local agencies involved in reviewing Federal OCS decommissioning projects, and with workshop attendees.

The Decommissioning Studies Workshop identified and prioritized studies for three key issue areas: Platform Associated Biota and Fishing; Protected Species, and Onshore Dismantlement, Disposal, and Recycling. Shell mounds and platform reefing are known to be topics of interest but discussion of them have been postponed until information is available from work on these issues by other agencies.

The Workshop identified important information gaps for all three issues. MMS has carefully reviewed these recommendations and further refined this list by identifying studies: 1) Which are site-specific or related to engineering design issues and should be completed by individual operators; 2) That MMS is currently funding or should consider for funding in the future and; 3) That could be jointly funded by MMS, agencies and/or industry. A summary of MMS's review of the Decommissioning Workshop's studies is provided in the table below.

Ongoing MMS studies and studies MMS intends to put forward for funding are shaded; studies in light text are recommended either for industry funding or are not recommended. The highest priority information needs per the Workshop are underlined.

Studies Information Needs Recommended at the Decommissioning Workshop	Discussion	Funding
Topic: Platform Associated Biota and Fishing		
1. Fish assemblages associated with platforms and pipelines in areas where data are non-existent or limited (Santa Ynez, Beta Unit, Summerland, and all pipelines)	High priority both in timing and need. Need to complete it before other studies initiated.	**Proposed in FY 05 .**

Studies Information Needs Recommended at the Decommissioning Workshop	Discussion	Funding
2. Characterization of natural habitats in the Santa Barbara Channel, Santa Maria Basin, and San Pedro Basin.	Multi-beam study funded in FY 04—will adapt comments from workshop to this study.	**Approved for FY 04 for MMS/USGS. Possible partnering opportunity.**
3. Contribution of platforms and pipelines to regional rockfish stocks.	Study would build on data from studies #1 and 2.	**Recommended for future year with joint funding with industry. Possible agency partnering opportunity.**
4. Possible mitigation measures for the effects of explosives on fishes.	Expect to handle the literature search through the FY 04 study "Summary of Knowledge."	**Pilot studies of potentially feasible mitigations are recommended for future year with joint funding with industry. Tier off Gulf of Mexico (GOM) studies.**
5. Micro-chemical signatures in fishes and the potential to determine the association of fishes with platforms/pipelines.	This was not rated high priority because it is not known if there is a unique platform signature. However, if a pilot study found one, it would be a highly valuable study.	**Pilot study recommended for FY 05. Possible savings realized through sharing boat time and fish collections with other agencies.**
6. Oceanographic features and their effects on the distribution and recruitment of fishes (potentially using CODAR).	Large uncertainly about amount and availability of data. Minimal direct relationship and use of information by MMS in decommissioning.	**No recommendation for funding at this time.**
7. Type and amount of recreational fishing associated with platforms.	Data not needed until closer to start of decommissioning process. Methods known.	**Recommended for future year for industry funding.**
8. Socioeconomics and value of recreational and commercial fishing associated with platforms, and the multiplying (cascading) economic effects of decommissioning activities on fisheries (tiering off of studies done for CINMS Marine Reserves Working Group).	MMS is not going forward at this time with this study due to the large scope and limited information to be gained relative to the MMS mission.	**No recommendation for funding at this time.**
9. Amount and usefulness of traditional recreational and commercial fishing grounds that would be returned, or new fishing grounds created, by the total removal of pipelines, platforms, and power cables.	May combine with #10	**Recommended for industry funding.**
10. An estimate of the amount of habitat removed as a result of decommissioning activities.	Fairly inexpensive study—some may be handled by known calculations.	Recommended for industry funding.

Studies Information Needs Recommended at the Decommissioning Workshop	Discussion	Funding
11. Potential indirect effects on regulatory system associated with decommissioning that could affect recreational and commercial fisheries (e.g. effects which lead to fishing closures.)	The expected results of this study were deemed to be appropriate for addressing within appropriate NEPA or CEQA processes.	No recommendation for funding at this time.
12. Additional area of preclusion during decommissioning activities.	Information related to this topic is expected as part of the normal submission in the applicant's plans.	No recommendation for funding at this time.
Topic: Protected Species (Marine Mammals, Birds, and Turtles)		
13. Physical and engineering aspects. Blast effects of charges placed within structures how acoustic impulse varies with charge energy; modeling the generated sound field of explosions, the expected engineering parameters and alternatives for removal in the Pacific OCS; the noise/shock transmission and absorption characteristics of sediment types in the region.	Handle review aspects through FY 04 study "Summary of Knowledge." Once the Gulf of Mexico Region completes their sound models, test in Pacific Region. MMS believes the modeling aspect is a high priority.	Recommended for future funding in FY 06 for studies on modeling which tier off work being conducted by MMS/industry in the Gulf of Mexico Region.
14. Ecology of affected species. The fine-scale distribution of affected species in project areas, the degree to which protected species use platforms, diving patterns and breath-hold times of marine mammals and sea turtles.	Handle literature search through FY 04 study "Summary of Knowledge." Field surveys are site and project specific.	**Recommended for industry funding for fine-scale field surveys.**
15. Direct and indirect biological effects. Impacts on species of concern, ranging from startle responses, temporary hearing threshold shifts (TTS), permanent injury, to death; the recovery time of animals from various forms of temporary injury (including TTS); the impacts of multiple shots on affected animals; the long-term cumulative impacts on animal populations using the platforms.	Need for pinniped TTS study is partly dependent on progress in area-specific modeling efforts and development of mitigation.	Recommended for joint funding for FY 06 for TTS studies.

Studies Information Needs Recommended at the Decommissioning Workshop	Discussion	Funding
16. Mitigation. Methods of detecting animals within the safety zone; potential methods of noise attenuation for underwater explosions of various types; the use of acoustic deterrence or attraction to protect species of concern.	Study should concentrate on detecting animals for highest probability of a useful mitigation technique. Previous studies of sound attenuation and acoustic deterrence/attraction have mixed results to date.	Recommended for industry funding.
Topic: Onshore Dismantlement, Disposal, and Recycling		
17. Potential disposal sites (options, incentives, permitting, criteria, and implications).	Combine #17 through 23 (below). Some initial aspects may be researched in FY 04 study "Summary of Knowledge."	**Recommended for industry funding.**
18. Marine growth (removal, regrowth, disposal, volumes, health implications).	See above comment.	See above comment.
19. Logistics and timing (sequencing, inter-agency coordination, manpower, vessels).	See above comment.	See above comment.
20. Inventory of materials (disposal, reuse, environmental benefits/impacts, pipelines).	See above comment.	See above comment.
21. Onshore implications (traffic noise, air quality, water quality, socioeconomics, landfill options).	See above comment.	See above comment.
22. Dismantlement options (effects of options, worker safety, timing, pipelines, reuse, costs).	See above comment.	See above comment.
23. Hazardous materials (HAZMAT) (define, disposal options, volumes, export of metals, landfill options).	See above comment.	See above comment.
Topic: Continuing studies which meet needs identified at the Decommissioning Workshop		
Summary of Knowledge	Addresses comments from the Decommissioning Workshop to learn state-of-the-art and research methods before designing studies for the Pacific.	**Funded in FY 04 by MMS.**

Studies Information Needs Recommended at the Decommissioning Workshop	Discussion	Funding
Invertebrate assemblages on shell mounds	Decommissioning Workshop did not discuss shell mounds; waiting for public release of California Environmental Impact Report.	**Funded in FY 04 by MMS.**
Fate of Juvenile Rockfish	MMS and the California Artificial Reef Enhancement (CARE) Program are jointly funding.	**Funded in FY 04 and FY 05 by MMS and CARE.**
Platform Fish Residence Time	Was mentioned by Decommissioning Workshop attendees as a study gap that MMS has already approved for funding.	**Funded in FY 04 and FY 05 by MMS and CARE.**

b. Supporting existing oil and gas production activities.

Biological Monitoring

In support of ongoing production, there is a continued need to monitor the shoreline plant and animal populations proximal to producing facilities. The amount of production from these facilities remains the same, although the facilities are aging. MMS needs to maintain a readiness along the shoreline to address potential impacts, including accidents, from OCS production for the duration of operations.

MMS focus on intertidal biology is due to the high variability of these systems and their proximity to offshore oil and gas resources. Continued study of resources are needed so that potential or real effects from oil and gas operations (including oil spills) are not erroneously confused with broader regional changes in marine nearshore and coastal ecosystems.

Marine Mammals and Seabirds and Update of Databases

From 1999-2002, the U.S. Geological Survey (USGS) and Humboldt State University (HSU) worked with MMS to conduct a multi-year study that quantified the at-sea distribution of seabirds and marine mammals off southern California to examine anthropogenic impacts and environmental changes. The survey data for this program were successfully collected and reported on schedule; however, additional work is needed on coupling the database to geographic information system software. To maximize the value of these data for MMS, the information must be coupled to standard MMS geographic information system software such as ArcGIS and made readily available to resource managers for planning decisions. These efforts have great potential for use in education and public outreach goals of the USGS, MMS, Channel Islands National Marine Sanctuary (CINMS), and Channel Islands National Park (CINP). This latter responds to a strong recommendation from the OCS Scientific Committee at their meeting in April, 2003.

SECTION 2.0 Proposed Study Profiles

2.1 Introduction

Four studies are proposed for FY 05; one of these is suggested for funding through the USGS/BRD program.

Decommissioning Studies:
Two new studies are identified for MMS funding in FY 05 which were recommended by the Decommissioning Workshop-- Fish Assemblages on Platforms and Pipelines Prior to Decommissioning and Reproductive Ecology and Body Burden of Resident Fish Prior to Decommissioning.

The Fish Assemblages study is recommended to fill in data gaps from previously completed studies. It is recognized that knowledge of fish assemblages inhabiting the facilities is fundamental to determining effects of decommissioning on fish populations. MMS has been working to fill this data need over the past several years with studies funded at many MMS platforms. The largest data gap is for pipeline assemblages, but regional data gaps also exist in the Santa Ynez Unit and Beta Unit. This information provides the broad understanding of the regional populations so that specific requirements can be identified for industry for their individual facilities.

The Reproductive Ecology and Body Burden of Resident Fish Prior to Decommissioning study would determine if a specific OCS platform signature, based on discharges or site-specific chemical characteristics of the platform location, can be identified on fish otoliths. This study is identified now because, if successful, the information can have far reaching effects on future studies needs and the MMS approach to decommissioning.

Biological Monitoring Studies and Program Support:
One biological monitoring study is proposed, MARINe, and a Program Support study, the Comprehensive Relational Database for Seabirds, Marine Mammals, and Update of Selected Databases is proposed. This year MARINe is focused on developing site-specific protocols for assessing impacts from oil spills at MARINe sites. This is the culmination of several years of effort. MMS/MARINe is working closely with the California State Department of Fish and Game to develop these protocols so that they are adopted by the National Resource Damage Assessment (NRDA) process. Reduced funding for one year of continued sampling at the MMS funded 24 sites is proposed, along with overall coordination of MARINe along with further reduced funding to coordinate MARINe and retain MMS access to data adjacent to MMS operations. The purpose of the Comprehensive Relational Database for Seabirds, Marine Mammals, and Update of Selected Databases is to integrate the seabird and marine mammal datasets already completed through recent MMS/USGS funding and other data sets (such as additional multibeam sonar surveys around platforms that may be decommissioned) expected to be completed within the next year into a comprehensive relational database linked to geographic information system coverages. This responds to another recommendation from the OCS Scientific Committee (number one in the letter from the Chair of the Committee to the Director of MMS) to insure access to the large data sets generated through the ESP.

2.2 Profiles of Studies Proposed for the FY 2005 NSL

Table A.

PROPOSED STUDIES and RANKINGS for FY 2005

Title	Regional Ranking	Discipline	Information Needs Addressed	Page #SDP
Fish Assemblages on Platforms and Pipelines prior to decommissioning	**1**	**Biology**	**Provides characterization of fish assemblages in unstudied areas, especially on the pipelines. Information provides basis for analyzing impacts to fish and invertebrates in relation to decommissioning operations.**	**16**
Reproductive Ecology and Body Burden of Resident Fish Prior to Decommissioning	**2**	**Biology**	**Study will address concerns from local agencies and State about the nature and extent of possible contaminants present in various tissues from platform resident and other fish/shellfish. MMS will need this information to analyze options for platform decommissioning such as artificial reefs or for possible mitigations during removal of platform associated shell mounds which may have contaminants. Also responds to a recommendation from the OCS Scientific Committee.**	**18**
MARINE Monitoring of Rocky Intertidal Sites Adjacent to Oil and Gas Platforms In Southern California	**3**	**Biology**	**Information generated provides basis for evaluating potential impacts to the shoreline from OCS operations offshore California. Several rocky monitoring sites are adjacent to possible future sand beach replenishment candidate sites that the State is studying in cooperation with MMS. This study reflects the transition of the MARINe Program to financial support of field work by other partners in the network. It retains access for MMS to regional data sets needed by MMS to continue to assess effects of oil and gas operations in the region.**	**20**
Comprehensive relational database for seabirds, marine mammals, and update of selected databases off southern California	**4**	**Biology**	**Coupling the extensive marine mammal and seabird database already generated for MMS with geographic information system software (ArcGIS) is needed to allow a downsized staff in the Pacific Region the ability to analyze the potential impacts to sensitive marine mammals and seabirds from future platform decommissioning projects. The database coupled to GIS will allow MMS staff to generate NEPA documents for decommissioning projects. Responds to recommendation from OCS Scientific Committee to improve access to MMS data sets. Recommended for USGS funding.**	**22**

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2005-2007

Region: Pacific OCS Region

Planning Area: Southern California

Title: Fish Assemblages on Platforms and Pipelines Prior to Decommissioning

Cost Range (in thousands): **Period of Performance:** FY 2005 - 2008

Description:

Background Knowledge of fish assemblages inhabiting OCS facilities is fundamental to determining the effects of decommissioning on fish populations. Since 1995 the Biological Resources Division (BRD) of the U. S. Geological Survey, the Minerals Management Service, and most recently the California Artificial Reef Enhancement Program, have provided funding to conduct research on the fishes that live around the platforms and on natural rock outcrops of central and southern California. The goal of this research was to determine the patterns of fish assemblages around both platforms and outcrops. A major synthesis of this work was published in 2003 and has been well received. The MMS Decommissioning Workshop recommended this present study to build upon the prior MMS/BRD work using the same methods but concentrating on the geographic areas where data is non-existent or limited. Regional data gaps exist for platforms in the Santa Ynez and Beta Units and for the platforms off Summerland. Perhaps the largest data gap exists for pipelines which have not been examined for their associated fish or invertebrate assemblages. Information from the unknown platform and pipeline sites would provide a broader understanding of the regional populations so that specific requirements can be identified for industry for their individual facilities. The goal of this investigation is to determine the patterns of fish assemblages around pipelines, platforms, and outcrops where data is non-existent or limited. Permission will need to be obtained from the operators to perform this research at the platforms. MMS will initiate discussions with the operators in the Beta Unit as soon as possible. Permission has been obtained from operators to perform this research on pipelines in multiple locations within the Santa Maria basin and the Santa Barbara Channel.

Objectives This necessary research involves surveys at numerous oil/gas pipelines, platforms, and natural reefs concentrating on facilities in the Santa Ynez and Beta Units and off Summerland CA. Research objectives include: 1) characterizing the fish assemblages on pipelines, around platforms, and on natural reefs, and 2) describing the spatial and temporal patterns of fish diversity, abundance and size distribution among habitat types.

Methods A multiple-year fish survey of pipelines, platforms, and nearby natural outcrops concentrating on geographic areas where data is non-existent or limited.

At Platforms and Natural Outcrops within SCUBA Depth:

1) Conduct scuba surveys of the upper 30 m of these platforms, along with surveys of relatively shallow natural outcrops; 2) Scuba surveys will be performed to estimate density (individuals per hectare), mean size (total length), and species composition of reef fishes in shallow portions of platforms (0–36 m, 0–119 ft. depth) and natural outcrops (6–20 m, 20–66 ft.); 3) Fish enumeration methods will consist of fish counts and fish size estimates using both visual and underwater videography methods; 4) Visual surveys will record fish density and size (total lengths) using underwater plastic sheets and slates; 5) All divers performing visual counts shall receive training in size estimation; and 6) Additional size estimates will be obtained using a Hi-8 mm video camera and laser calibration system.

At Platforms and Natural Outcrops below SCUBA Depth:
1) Conduct fish surveys using the *Delta* submersible, a 4.6 m, 2-person vessel, operated by Delta Oceanographics of Oxnard, California along belt transects about two meters from the substrata, while the submarine maintains a speed of about 0.5 knots; 2) Make transects around the bottom of the platform and around each set of cross beams to a mini-mum depth of 20–30 m (66–100 ft.) below the surface (e. g., midwater habitat); and 3) Conduct belt transects to sample the shell mounds and natural rock outcrops. During all transects document (A) species (if known), (B) estimated total length, (C) the habitat it occupied (e.g., rock, sand, mud, cobble, boulder), (D) its position relative to the substrate (e. g., in crevice, on reef crest, on slope, above structure), and (E) the distance of the fish from that substrate.

On Pipelines:
1) Determine which method(s) (ROV , SCUBA, and/or submersible) is appropriate for pipelines; 2) Conduct surveys on pipelines within a range of geographical settings and depths; 3) Conduct the appropriate surveys to determine fish assemblages including (1) species (if known); (2) estimated total length; (3) the habitat that the pipeline occupies (e.g., rock, sand, mud, cobble, boulder); (4) the position of the fish relative to the pipeline and substrate (e. g., in crevice, on pipeline crest, on slope, above structure); and (5) the distance of the fish from the pipeline and the natural substrate.

Products This study will produce both hardcopy and digital reports of the investigation and several peer-reviewed publications and an ARCGIS compliant database layer.

Importance to MMS The fate of spent offshore platforms and pipelines off California has been a subject of considerable debate, much of which is focused on the potential importance of the fish populations at these facilities. Data gaps concerning the fish assemblages exist at some of the oldest facilities yet these facilities may be the first to be decommissioned. Knowledge of the potential importance of the population at pipelines and platforms to the depleted Pacific rockfish stocks is essential for fully evaluating the various options proposed for decommissioning California's offshore oil platforms. MMS will be faced with decisions of whether to require pipeline removal as platforms are decommissioned.

Date Information Required: This information is needed for proper analysis and decision-making for increased Pacific OCS oil and gas decommissioning activities in the Santa Maria Basin and Santa Barbara Channel sometime in 2008.

Revised date: 2/9/04

ENVIRONMENTAL STUDIES PROGRAM: ANNUAL STUDIES PLAN FY 2005-2007

Region: Pacific OCS Region

Planning Area: Southern California

Title: Reproductive Ecology and Body Burden of Resident Fish Prior to Decommissioning.

Cost Range (in thousands): **Period of Performance:** FY 2005 - 2008

Description:
Background In order to analyze the environmental consequences of decommissioning platforms on local or regional fish populations, the sources of young fish recruiting to those populations and the general pollution load carried by reproducing adults at platforms must be known. This is especially true when the platforms are known to harbor large numbers of resident reproducing adults from species that are regionally depleted and being considered for listing under the Endangered Species Act. This study will be phased with two separate work tasks. The first will develop a technique to judge the degree to which movement and recruitment of rockfish occur from platforms to local and perhaps regional populations from platforms off California. The second will relate the level of contaminants in platform resident rockfish to the local and regional background quantity and variability of contaminants found in the same or similar age species.

Task 1: Rockfish are live bearers and the larvae remain proximate to the adults for some time. It has been shown that rockfish larvae lay down detectable microchemical otolith signatures in less than 24 hours that match the immediate surrounding water chemistry. For a small larva, this can potentially give us a record of its origin, which is the key to establishing the source and patterns of connections between the platform fish and local or regional fish populations. If a discreet and specific platform signature can be detected, the extent that platform adults contribute to local recruitment can be measured.

Task2: Despite the fact that the question of contamination continues to arise during most discussions of resident fish and shellfish at platforms, very little study has been made of this subject. The most common contaminants discharged at platforms are hydrocarbons and trace metals. There is some evidence from older platforms in state waters that these contaminants accumulate in the shell mounds that build up under platforms over time. Given the recent alarm over mercury and PCB in popular edible fishes and its inappropriate application to resident rockfish at platforms, it is timely to determine what contaminants are in various tissues of resident fish and shellfish at platforms. The contaminant load must be seen against and compared to the background load in the area.

Task 1 Objectives 1) To determine which discreet, detectable trace element or suite of elements are present in seawater at platforms and not present in other local water bodies; 2) To determine if the platform trace element(s) is detectable as a microchemical signature in rockfish larvae and not detectable in rockfish from control sites; and, 3) To determine the degree to which otolith chemistry varies as a function of water chemistry.

Task 2 Objectives 1) To survey and determine the nature and extent of contaminants present in various tissues from platform resident fish and shellfish; 2) Compare platform resident body burdens and contaminants to those found in similar size and species of fish and shellfish at various locations away from platforms 3) Relate the level of contaminants in platform species to the local and regional geospatial background quantity and variability of contaminants in fish and shellfish.

The methods for sample collections necessary for Tasks 1 and 2 are essentially the same and can be performed for both studies at the same time. Samples for Task 2 can be separated and stored while Task 1 continues.

Task 1 Methods 1) Using SCUBA diving and standard collection devices acquire sufficient numbers from several species of rockfish larvae and/or juveniles from 1-2 platforms and several control sites. 2) Collect water samples several times during the year to characterize the aquatic environment at the same sites and analyze bulk chemistry; 3) Analyze samples (extracted otoliths and water) with either inductively-coupled plasma mass spectrometry (ICP-MS) or atomic emission spectroscopy (ICP-AES) for Ba, Zi, Ca, Pb, Cu, Sr, B, Li, and Ni; 4) Address the degree to which otolith chemistry varies as a function of water chemistry and spatial scale using multivariate statistical analyses; and, 5) Analyze if species differences affect otolith uptake of trace elements and use discriminant function analysis to test the degree of separation of otoliths by element, geographic location, and species.

Task 2 Methods 1) Using SCUBA diving and/or standard collection devices such as traps or trawls collect or acquire sufficient numbers of the same species and size class of shellfish and adult rockfish, benthic, and pelagic fishes from platforms, shell mounds, and from control sites away from platforms; 2) Remove and freeze/store appropriate muscle, gall bladder, liver/hepatopancreas green gland, gonad, and nervous system tissues for analyses; 4) Analyze tissue samples for PAH's and/or metabolites, poly chlorinated biphenyl's (PCB's), dichloro-diphenyl-trichloroethane (DDT) and/or metabolites, and trace and heavy metals; and 5) Compare the contaminant load of platform resident species to the pre-existing geospatial background of the areas near offshore platforms.

Products This study will produce both hardcopy and digital reports of the investigation and several peer-reviewed publications.

Importance to MMS The fate of spent offshore platforms and pipelines off California has been a subject of considerable debate, much of which is focused on the potential importance of the fish at these facilities to the local and regional populations. Knowledge of the importance of resident, reproducing rockfish at offshore facilities to the depleted Pacific rockfish stocks is essential for fully evaluating the various options proposed for decommissioning California's offshore oil platforms. Task 1 will determine if using microchemical signatures can differentiate a platform source for rockfish stocks. The question of contamination and contaminant load in platform resident fish and shellfish continues to arise during discussions with both State and Federal agencies regarding the impacts from decommissioning and the importance of platform resident populations. Task 2 will provide the knowledge of the quantity and extent of contaminants in fish and shellfish tissue within the regional geospatial background. Both tasks of this study are essential for fully evaluating the various options proposed for decommissioning California's offshore oil platforms and associated mitigation measures that may be analyzed with regard to the fate of the shell mounds associated with these platforms.

Date Information Required: This information is needed for proper analysis and decision-making for increased Pacific OCS oil and gas decommissioning activities in the Santa Maria Basin and Santa Barbara Channel. This study should be performed as soon as possible to determine if it is feasible to attempt to obtain a microchemical signature of other fish species at other platforms

Revised

Region: Pacific OCS Region

Planning Area(s): Southern California

Title: MARINe Monitoring of Rocky Intertidal Sites Adjacent to OCS Oil and Gas Platforms in Southern California

Cost Range: (in thousands) **Period of Performance:** FY 2005 - 2007

Description:

Background MMS and its 22 partners in MARINe biannually monitor 55 established rocky intertidal sites across central and southern California using a standardized field protocol and share a common database (www.MARINe.gov). Over the next two years, MMS plans to substantially reduce its financial involvement in MARINe, shifting funding to its partners to continue the field work monitoring. MMS proposes to continue to participate actively in the management and oversight of MARINe in order to be able to insure the security and accuracy of data already funded by MMS and to be able to access future data critical to our ongoing operations and to fulfill our responsibility to monitor OCS platforms and pipeline operations. MMS and its MARINe partners are committed to actively pursue grants and other programs to obtain funding in out years for the ongoing monitoring at sites adjacent to existing OCS oil and gas platforms currently funded by MMS.

Over the next three years, a high priority for MARINe is to develop, field test, and finalize site-specific protocols to be used during the first 48 hours of an oil spill by MMS, the operator, and trustee agencies to assess impacts to shoreline resources adjacent to OCS facilities. MMS is working with the California Office of Spill Prevention and Response on this effort to ensure they would become the basis for the National Resource Damage Assessment studies. The protocols will be placed into the operator's Oil Spill Plans, and into the Area Contingency Plans for Southern California. Many years of work have been done to enable this task to move forward at this time.

Objectives This study will provide for the continued monitoring of some rocky intertidal sites on the mainland shore immediately adjacent to OCS facilities, a two year transition to other sources of funding, and presumes that funding for a significant portion of the existing sites has been picked up by other MARINe partners. Information generated provides the basis for evaluating impacts to the shoreline from OCS activities, especially accidental oil spills. Management and coordination of MARINe and database tasks are included so that MMS has access to the data needed for management decisions. It is anticipated that MMS will remain involved in the coordination of MARINe at a staff level and low level of program support funding beyond this study.

Methods Sites are monitored biannually by teams of field biologists, including the MMS MINT team. Barnacles, mussels, seastars, black abalone, surfgrass, limpets, turf weed, rock weed and other algae are either photographed in fixed plots in the field, or measured and counted in irregular, circular or band plots. The sampling protocols are standardized across MARINe and are used by all MARINe field teams. Data is placed in a common database and is reviewed and published by the Science Panel.

Importance to MMS This information allows MMS to directly assess potential and real impacts to the coastline from OCS operations. In particular, it allows MMS to directly assess impacts to shoreline resources from accidental oil spills. It has been shown that the data collected is sufficient to detect an 8-15% change in species assemblages allowing for a high level of confidence in the data which allows MMS to differentiate between naturally caused impacts and OCS or other anthropogenic impacts. It also fosters continued partnerships with local, State and Federal government agencies involved in monitoring research and the data is actively used by many entities for planning shoreline projects, marine protected areas, and reserves. This study implements MMS's mandate to monitor the marine and coastal environment adjacent to OCS operations as described in the OCS Lands Act. We anticipate the continued involvement of MMS staff as part of the coordinating and data management function of MARINe in order to assure MMS access to the MARINe database.

Products Updated website with the most recent trends of species across Southern and Central California, peer-reviewed publications on significant regional trends, reports for local, State and Federal decision makers on the health of the shoreline. Decision makers across the State are very interested in MARINe data in the establishment and monitoring of multiple marine protected areas and reserves. We anticipate that educational curriculum materials would evolve from this study. This responds to a recommendation from OCS Scientific Committee.

Date Information Required: Information will be used immediately to assess impacts from an oil spill from OCS facilities if and when a spill occurs. MMS also will use this information in reviewing oil spill contingency plans that are required from operators of offshore platforms in California. The next round of plan review is scheduled to begin in approximately one year. Information is being used by multiple agencies to make decisions about marine protected areas, reserves, planning and permitting activities along the coast.

Revised date: 2/04

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Pacific OCS Region

Planning Area: Southern California Planning Area

Title: Comprehensive relational database for seabirds, marine mammals, and update of selected databases off southern California (USGS BRD)

Cost Range: **Period of Performance:** FY 2005 – 2007

Description:

Background From 1999-2002, the U.S. Geological Survey (USGS) and Humboldt State University (HSU) worked with MMS to conduct a multi-year study that quantified the at-sea distribution of seabirds and marine mammals off southern California to examine anthropogenic impacts and environmental changes. Over 55,000 km were flown, more than 485,000 seabirds (67 species) and 64,000 marine mammals (19 species) were counted, and 1900 locations from 248 radio-marked birds were recorded. Seven client agencies provided matching funds or in-kind support, including the California Department of Fish and Game (CDFG), U.S. Navy (USN), NOAA Channel Islands National Marine Sanctuary (CINMS), NPS Channel Islands National Park (CINP), U.S. Fish and Wildlife Service, Moss Landing Marine Laboratories (MLML), and the Wildlife Health Center (UC Davis). The study provided resource managers with current information on distribution and abundance patterns and related present data to information from the early 1980s (Hunt *et al.* 1979, Briggs *et al.* 1987). Over the past several years, MMS has invested in several database systems to facilitate recovery of critical data for ongoing reviews and in particular to facilitate recovery of data during an oil spill. Additionally, MMS has continued to collect new information throughout the Bight including multibeam side scan sonar survey data from USGS (via a contract with Ocean Imaging, Inc.) and the Monterey Bay Aquarium Institute for areas adjacent to oil and gas operations. The purpose of this study is to ensure that existing databases are integrated into standard MMS geographic information system software such as ArcGIS and to populate databases with new information as it becomes available through the Studies Program.

Objectives The survey data for this program were successfully collected and reported on schedule; however, work is far from complete. To maximize the value of these data for MMS and other management agencies, the information must be made readily available to resource managers for planning decisions. Furthermore, this work has great potential for use in education and public outreach goals of the USGS, MMS, CINMS, and CINP. Thus, the purpose of this study is to distribute the seabird and marine mammal dataset to client agencies in a comprehensive relational database linked to geographic information system coverages, and to develop a webpage for public access. To populate the fisheries database, marine mammals and seabird database, bird database and cultural resource databases with information from recent MMS studies. Studies with results which need to be included to update existing databases include: Ocean Imaging Hardbottom GIS-Database System, new information from the multi-beam BRD Contract for FY 2004-2005 including original data and characterization/bio data, new data from OCS projects such as the recent Crystal Energy - Fugro side-scan survey of area around Platform Grace and the projected pipeline route to shore; new data from OCS projects such as the Hubbs-Sea World Mariculture project and its survey around Platform Grace; new data from the California Department of Fish and Game (CDFG) new kelp bed survey; new data from surveys in State waters such as planned for the tar seep study; new data from Channel Islands/ Sanctuary/Monterey Bay Aquarium Research Institute (MBARI).

Methods The database is summarized by density and is stored by species, season, and subarea in geographic information system coverages at scales including 1' and 5' blocks. To maximize management utility for client agencies, a relational database that allows users to query for specific values (densities, totals) and factors (species, season, subarea) is needed. The USGS will work with Point Stephens Research (T. Mecklenburg) to develop database fields for Microsoft Access linked to GIS coverages and a graphical interface. The MMS Pacific OCS Region supported development of this relational database design for fisheries databases, and it has direct application to the seabird and marine mammal survey database. This product will be distributed on CDROM and packaged with Arc Explorer (ESRI, Inc.) software. Data also will be provided to the public on a webpage served with the interactive program ArcIMS (ESRI, Inc., *see* www.werc.usgs.gov/pinsat). New or revised data from recent surveys would be merged into existing MMS databases in the standard MMS software and using the standard MMS formats. Existing MMS data bases used in the Pacific OCS Region include a fisheries database, marine mammal and seabird database, and hard bottom database produced under previous MMS Environmental Studies Program contracts.

Products A comprehensive, user-friendly relational database linked to geographic information system coverages off the southern California coast will be made available to MMS staff and resource managers. Also, a webpage with summarized information on seabirds and marine mammals off the southern California coast will be developed.

Importance to MMS The seabird and marine mammal database will provide a detailed summary of current abundance and distribution information to support MMS analysis of potential impacts from and decisions on planned and future projects such as OCS platform decommissioning. . The access to and use of the most recent and accurate data sets are key to performing scientifically credible analyses of any proposals for replacing pipelines and power cables (such as the recent power cable replacement for the Santa Ynez Unit) associated with ongoing oil and gas operations in the Santa Barbara Channel and Santa Maria Basin. In addition, future environmental documents prepared for decommissioning will be based on accurate estimates of sensitive species adjacent to the decommissioning operations. This is singularly important in the analysis of potential impacts of explosive removal of platform jackets on resident fish and on local and migratory populations of marine mammals and seabirds.

Date Information Required: Fall 2006 to assist with ongoing analysis for current operations and to insure that data are available prior to expected submission of decommissioning projects.

Revised date: February 11, 2004

Literature Cited:

Anderson, J.W., D.J. Reish, R.B. Spies, M.E. Brady, and E.W. Segelhorst. 1993. Pp 682-766 *in*: M.D. Dailey, D.J. Reish, and J.W. Anderson (eds.), Ecology of the Southern California Bight: A Synthesis and Interpretation. Berkeley/Los Angeles: University of California Press.

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Briggs, K.T., W.B. Tyler, D.B. Lewis, and D.R. Carlson. 1987. Bird communities at sea off California: 1975 to 1983. Cooper Ornithological Society, Studies in Avian Biology No. 11. 74 pp.

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Hunt, G.L., Jr., R.L. Pitman, M. Naughton, K. Winnet, A. Newman, P.R. Kelly, and K.T. Briggs. 1979. Distribution, status, reproductive ecology, and foraging habits of breeding seabirds. *In* Summary of marine mammal and seabird surveys of the southern California Bight area, 1975-1978. U. S. Department of Interior, Bureau of Land Management. Los Angeles, CA.

Straughan, D. 1971. Oil pollution and sea birds. Pp. 307-312 *in*: Biological and oceanographical survey of the Santa Barbara Channel oil spill, 1969-1970. Vol I, Biology and bacteriology. Allen Hancock Found, University of Southern California, Los Angeles.

2.3 Profiles of Studies Proposed for the FY 2006 NSL

Title	Regional Ranking	Discipline	Information Needs Addressed	Page #SDP
Decommissioning Information Transfer Symposium	**tbd**	**Program Support**	**Provides MMS with the ability to present results of decommissioning studies at MMS dedicated sessions to agencies directly involved in decommissioning.**	**26**
Modeling Potential Impacts of Explosive Removal of Offshore Structures on Marine Mammals in the Pacific OCS Region	**tbd**	**Endangered Species**	**Information is needed to determine and design appropriate mitigation and alternatives for decommissioning of facilities near endangered species populations. Date of study initiation may slip to 07 as the design is dependent on results from an ongoing GOM study.**	**28**
A Study of Temporary Threshold Shift (TTS) in California Sea Lions (*Zalophus californianus*) Exposed to Pulsed Low Frequency Sound	**tbd**	**Endangered Species**	**Information is needed to determine and design mitigation for ongoing development plan revisions and for potential decommissioning projects in areas where endangered species of pinnipeds occur. Efforts in the GOM do not address pinniped species protected off California; timing of this study may slip as the design of the study will rely on results from ongoing GOM studies.**	**30**

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Pacific OCS Region

Planning Area(s): Southern California

Title: **Decommissioning Information Transfer Symposium**

Cost Range: **Period of Performance:** FY 2006

Description:

Background The Minerals Management Service Pacific OCS region has a long history of supporting the transfer of information gained through the Environmental Studies Program to interested users via Information Transfer Meetings (ITMs) and major regional conferences such as the Fifth California Islands Symposium held in Santa Barbara in 1999. The ITMs have provided a showcase for disseminating the results of studies funded by the MMS such as the important platform decommissioning studies now being done and those that will be completed in the next two years to State agencies, local government agencies, non governmental organizations, academia, and the public. MMS has received numerous compliments for its high quality science as a result of these symposia and for its support of such meetings at which the scientists working for MMS can be questioned directly by attendees and provide for a dialog with those people that need to understand and use the results of MMS funded research. In addition, MMS has been able to receive feedback on its Environmental Studies Program over the years and make it more responsive to the information needs of the region decision makers.

The Pacific Region has begun to emphasize and implement environmental studies related to future decommissioning of offshore oil and gas facilities. Some of these studies have been completed as of 2004 and many more will have been completed by 2006. The Decommissioning Information Transfer Meeting will occur in FY 2006 and will be a prime opportunity to showcase the MMS decommissioning studies results that have been completed and will be completed by that time. The symposium serves a as a forum at which MMS can facilitate discussion about future decommissioning options and help defuse potentially controversial options such as rigs to reefs through timely presentation of these studies.

Objectives The Pacific OCS Region proposes to participate in a partnership with the Channel Islands National Park Service and the Channel Islands National Marine Sanctuary to provide financial and planning support for the next California Islands Symposium. We have preliminary indications that the Park service will provide matching funds to those supplied by the MMS. This will involve scientists from MMS funded research in the symposium presentations and poster sessions. The objective is to highlight the research that has been accomplished under MMS funding related to future offshore oil and gas decommissioning as well as other MMS funded research.

Methods The Pacific OCS Region will serve as one of several co-chairs of the next California Islands Symposium with MMS planning sessions on decommissioning related research. The California Islands Symposium allows MMS to leaverage its traditional ITM funds and attract a larger audience. Other co-chair organizations already committed are the Channel Island National Park and the Channel Islands National Marine Sanctuary (both

sponsors and chairs of the most recent Symposium). Funding by MMS will be in conjunction with funding from the National Park Service and direct support from the Sanctuary to provide for the preparation of the proceedings from the symposium, meeting facilities, support for several key noted key note speakers, and preparation of pre-meeting materials.

Products Proceedings of the symposium in digital format and hard copy (limited numbers of hard copy)

Importance to MMS The next Symposium will be critical to MMS as the Region gets closer to preparing environmental documents that will be required for decommissioning offshore oil and gas facilities. Dissemination of the results of MMS funded studies that are the foundation of environmental documents is needed to support the ready acceptance of MMS prepared environmental documents (e.g. EISs and EAs). The Symposium has traditionally served as one of the most effective vehicles in disseminating such MMS research. It also has served as a critical forum for feedback to MMS on the quality of the information generated in the Environmental Studies Program as well as providing added direction to those topical areas that may need additional study.

Date Information Required: Fiscal Year 2006 or early Fiscal Year 2007.

Revised date: February 2004

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Pacific OCS Region

Planning Area: Southern California Planning Area

Title: Modeling Potential Impacts of Explosive Removal of Offshore Structures on Marine Mammals in the Pacific OCS Region

Cost Range: **Period of Performance:** FY 2006 - 2008

Description:

Background Twenty-three (23) oil and gas structures currently exist on the Pacific Outer Continental Shelf (OCS). Some of the OCS platforms are approaching the end of their productive life, and the permit-application process for decommissioning could begin during this decade. Within one year of lease termination, the Minerals Management Service (MMS) requires that structures be removed from the OCS and that they be severed at least 15 feet below the seafloor. On the Gulf of Mexico OCS, more than 5,000 structures have been removed; approximately 60 percent of these have been removed using explosive techniques. It is expected that the removal of Pacific OCS Region structures will likely also involve the use of explosives.

The detonation of explosives underwater can result in the injury or death of fish and marine protected species, such as marine mammals. However, the potential damage to marine life from explosives can be mitigated. As a federal agency, MMS is required to ensure that the oil and gas activities it regulates comply with regulations stemming from the National Environmental Policy Act (NEPA), Marine Mammal Protection Act (MMPA), Endangered Species Act (ESA), and Outer Continental Shelf Lands Act (OCSLA). Consequently, MMS requires the best available information regarding the potential impacts of explosive structure removals on marine mammals. The ability to predict potential effects on marine mammals from these activities will assist MMS in meeting its regulatory obligations under the acts cited above and in making management decisions to minimize the potential taking of marine mammals while permitting the explosive removal of offshore structures.

Objectives The purpose of this investigation is to model the potential effects of the explosive removal of offshore structures on marine mammals in southern California waters. The study objectives are: 1) to integrate a marine shock wave/sound propagation model, such as that developed for MMS by Applied Research Associates, Inc. (Dzwilewski and Fenton, 2003), with a marine mammal impact-assessment model, such as the Acoustic Integration Model (AIM) developed by marine Acoustics, Inc. (Ellison and Frankel, 2003); 2) to incorporate the appropriate parameters (e.g., distribution, behavior, diving) specific to California marine mammal species into the impact assessment model; and 3) to apply the models using realistic explosive-removal scenarios to predict potential impacts to marine mammals (including mortality, injury, and permanent and temporary hearing loss).

Methods This will be a computer-based modeling study involving the integration of two models, a marine shock wave/sound propagation model and a marine mammal impact assessment model. The contractor will obtain the most current available data on marine mammals off southern California for incorporation into the impact assessment model.

Products The contractor will provide MMS with a final report and recommendations for mitigation (i.e., the definition of exclusion zones) to protect marine mammals from the effects of the explosive removal of offshore structures.

Importance to MMS The use of explosives to remove offshore structures on the Pacific OCS may negatively impact protected species such as marine mammals. Therefore, these actions will require that MMS prepare environmental documents and consult per the Endangered Species Act (ESA) and Marine Mammal Protection Act (MMPA) with National Oceanic and Atmospheric Administration (NOAA) Fisheries. The MMS requires information on the potential effects of explosive removals in order to make management decisions concerning structure removals in conjunction with marine mammals.

Date Information Required: Needed by FY 2008 to assist the MMS in meeting its regulatory obligations and making management decisions for platform removals offshore southern California through the end of the decade.

Revised date: February 17, 2004

References:

Dzwilewski, P.T., and G. Fenton. 2003. Shock wave/sound propagation modeling results for calculating marine protected species impact zones during explosive removal of offshore structures. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2003-059. 39 pp.

Ellison, W., and A. Frankel. 2003. The application of the Acoustic Integration Model (AIM) to EROS and seismic issues in the Gulf of Mexico. Presentation made at MMS Gulf of Mexico OCS Region 2003 Information Transfer Meeting, January 14-16, 2003, New Orleans, LA.

ENVIRONMENTAL STUDIES PROGRAM: Studies Development Plan FY 2005-2007

Region: Pacific OCS Region

Planning Area: Southern California Planning Area

Title: A Study of Temporary Threshold Shift (TTS) in California Sea Lions (*Zalophus californianus*) Exposed to Pulsed Low Frequency Sound

Cost Range: **Period of Performance:** FY 2006 - 2008

Description:
Background Twenty-three (23) oil and gas structures currently exist on the Pacific Outer Continental Shelf (OCS). Some of the OCS platforms are approaching the end of their productive life, and the permit-application process for decommissioning could begin during this decade. Within one year of lease termination, the Minerals Management Service (MMS) requires that structures be removed from the OCS and that they be severed at least 15 feet below the seafloor. On the Gulf of Mexico OCS, more than 5,000 structures have been removed; approximately 60 percent of these have been removed using explosive techniques. It is expected that the removal of Pacific OCS Region structures will likely also involve the use of explosives. The detonation of explosives underwater can result in the injury or death of fish and marine protected species, such as marine mammals. It is also known that exposure to loud sound can cause a temporary threshold shift (TTS), the short-term elevation of an animal's hearing threshold at particular frequencies. However, relatively little is known about TTS in marine mammals, particularly in response to impulsive sound such as that produced by underwater explosions.

U.S. Navy researchers have recently begun studying TTS in small cetaceans using low-frequency sound sources (Finneran et al., 2000, 2002). A possible study topic relevant to EROS activities in the Pacific OCS Region would be a study of pinniped responses to extremely short, impulsive signals. Information on the levels of pulsed, low-frequency sound that induce TTS in pinnipeds would improve our understanding of the potential impacts of underwater explosions on marine mammals. This, in turn, could lead to improvements in the design of mitigation measures, particularly in the definition of species- or group-specific exclusion zones. The proposed subject of this study, the California sea lion (*Zalophus californianus*), is abundant in southern California waters and the marine mammal species most likely to be present in the vicinity of any future platform removal in the Pacific OCS Region.

Objectives This would be a study of the occurrence of TTS in California sea lions exposed to pulsed, low frequency sounds such as those produced by under water explosives. The information obtained would substantially improve the design of mitigation measures to protect sea lions and other pinnipeds during future explosive removals of offshore structures in the Pacific OCS Region.

Methods This is envisioned as a captive or semi-captive study, using California sea lions as the subject.

Products The contractor will provide MMS with a final report and recommendations for mitigation (i.e., the definition of exclusion zones) to protect California sea lions from the effects of the explosive removal of offshore structures.

Importance to MMS The use of explosives to remove offshore structures on the Pacific OCS may negatively impact protected species such as marine mammals. Therefore, these actions will require that MMS prepare environmental documents and consult per the ESA and MMPA with National Oceanic and Atmospheric

Administration (NOAA) Fisheries. The MMS requires information on the potential effects of explosive removals in order to make management decisions concerning structure removals in conjunction with marine mammals.

Date Information Required: Needed by FY 2008 to assist the MMS in meeting its regulatory obligations and making management decisions for platform removals offshore southern California through the end of the decade.

Revised date: February 17, 2004

References:

Finneran, J.J., C.E. Schlundt, D.A. Carder, J.A. Clark, J.A. Young, J.B. Gaspin, and S.H. Ridgway. 2000. Auditory and behavioral responses of bottlenose dolphins (*Tursiops truncatus*) and a beluga whale (*Delphinapterus leucas*) to impulsive sounds resembling distant signatures of underwater explosions. Journal of the Acoustical Society of America 108(1):417-431.

Finneran, J.J., C.E. Schlundt, R. Dear, D.A. Carder, and S.H. Ridgway. 2002. Temporary shift in masked hearing thresholds in odontocetes after exposure to single underwater impulses from a seismic watergun. Journal of the Acoustical Society of America 111(6):2929-2940.

SECTION 3.0 Topical Areas for Years 2007

Contribution to Stock

Once studies have been completed which describe the fish assemblages around OCS platforms and pipelines, estimates of their contribution to fish stock will need to be made in order to assess the impact of decommissioning.

Shell Mounds

Studies will be needed to assess the physical and chemical characteristics of shell mounds. Studies of shell mounds left by decommissioned platforms in State waters indicate the need to understand the concentration of certain chemicals and their potential bioavailability in order to assess potential impacts of shell mound removal. The State studies are being completed; their reviews will help design appropriate studies for Federal facilities.

Sand and Gravel

California has signed a Memorandum of Understanding with MMS to inventory sand and gravel resources within Federal waters for beach replenishment and stabilization. The State is interested in the distribution of sand and gravel resources and this topic and mapping of those resources is incomplete for many areas offshore California. Further information on the effects of using sand resources are also needed.